Water level data collected adjacent to subtidal oyster reefs in 3 field sites in Bogue Sound, North Carolina during the spring of 2015.

Website: https://www.bco-dmo.org/dataset/720194
Data Type: Other Field Results
Version: 1
Version Date: 2017-12-14

Project
» Microbial Regulation of Greenhouse Gas N2O Emission from Intertidal Oyster Reefs (Oyster Reef N2O Emission)

Contributors	Affiliation	Role
Piehler, Michael F.	University of North Carolina at Chapel Hill (UNC-Chapel Hill-IMS)	Principal Investigator
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Abstract
Water level data collected adjacent to subtidal oyster reefs in 3 field sites in Bogue Sound, North Carolina during the spring of 2015. Water levels collected with HOBO water level logger installed at sediment level just below deepest oyster reef.

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Coverage

Spatial Extent: **Lat**:34.710129 **Lon**:-76.867882
Temporal Extent: 2015-09-24 - 2016-05-04

Dataset Description

Water level data collected adjacent to subtidal oyster reefs in 3 field sites in Bogue Sound, located in coastal North Carolina.

Methods & Sampling

Water levels collected with HOBO water level logger installed at sediment level just below deepest oyster reef. Deployed for approximately 1 month during spring 2015. The 3 field sites are sites of oyster reef and salt marsh restoration. Identified in data as UNC Institute of Marine Sciences (IMS), Carrot Island (Carrot), and NOAA Beaufort (NOAA). All sites located in Bogue Sound near Morehead City, NC.

Data Processing Description

Corrected for atmospheric pressure (obtained from local NOAA station) and brackish water conditions.

BCO-DMO Data Processing Notes:

- data from 3 tabs combined into one table
- blank cells filled with nd
- separated date and time into two columns
- added ISO_DateTime column
- reformatted date to yyyy/mm/dd

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Data Files

File
water_level.csv (Comma Separated Values (.csv), 508.04 KB) MD5:657549c4b5be1aba9465dfa662a92f8f Primary data file for dataset ID 720194

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Parameters

Parameter	Description	Units
Site	Site where data were collected	unitless
Date	Date of sampling; YYYY/MM/DD	unitless
Time	Time of sampling; HH:MM	unitless
ISO_DateTime_UTC	DateTime ISO formatted; UTC	unitless
HOBO_depth	Water levels collected with HOBO water level logger installed at sediment level just below deepest oyster reef.	meters

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Instruments

Dataset-specific Instrument Name	HOBO Water Level Logger
Generic Instrument Name	Water Depth Logger
Dataset-specific Description	Used to collect water levels in oyster reefs
Generic Instrument Description	For measuring and recording water levels in rivers, streams, and wells.

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Project Information

Microbial Regulation of Greenhouse Gas N2O Emission from Intertidal Oyster Reefs (Oyster Reef N2O Emission)

Extracted from the NSF award abstract:

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Oyster reefs are biogeochemical hot spots and prominent estuarine habitats that provide disproportionate ecological function. Suspension-feeding eastern oysters, Crassostrea virginica, are capable of improving water quality and diminishing eutrophication by filtering nutrients and particles from the water and depositing them in the sediments. Remineralization of these deposits may enhance sedimentary denitrification that facilitates nitrogen removal in tidal estuaries. However, the scientific underpinning of oyster reef function has been challenged in various studies. In addition, recent studies of filter feeding invertebrates reported the production of nitrous oxide (N2O), a greenhouse gas, as an end product of incomplete denitrification by gut microbes. C. virginica could be another source of N2O flux from intertidal habitats. Preliminary work indicated substantial N2O production from individual oysters. The estimated N2O production from high density oyster reefs may exceed the N2O flux measured from some estuaries. With the new discovery of N2O emission and uncertainty regarding eutrophication control, the ecological value of oyster reef restoration may become equivocal.

This project will quantify N2O fluxes to understand the factors controlling N2O emission from oyster reefs. Sedimentary N processes will be examined to develop an oyster reef N model to estimate N2O emission from tidal creek estuaries relative to other N cycling processes. The PIs hypothesize that intertidal oyster reefs are a substantial source of N2O emission from estuarine ecosystems and the magnitude of emission may be linked to water quality. If substantial N2O flux from oyster reefs is validated, ecological benefits of oyster reef restoration should be reevaluated. This interdisciplinary research team includes a microbial ecologist, a biogeochemist, an ecologist and an ecosystem modeler. They will utilize stable isotope and molecular microbiological techniques to quantify oyster N2O production, elucidate microbial sources of N2O emission from oysters and sediments, and estimate seasonal variation of N2O fluxes from oyster reefs. Measurements from this study will be integrated into a coupled oyster bioenergetics-sediment biogeochemistry model to compare system level rates of N cycling on oyster reefs as a function of oyster density and water quality. Modeling results will be used to assess the relative trade-offs of oyster restoration associated with N cycling. They expect to deliver the following end products:1) estimation of annual N2O flux from oyster reefs as an additional source of greenhouse gases from estuaries, 2) a better understanding of the environmental and microbial factors influencing N2O and N2 fluxes in tidal estuaries, 3) transformative knowledge for the effect of oyster restoration on water quality enhancement and ecosystem function, 4) direct guidance for oyster restoration projects whose goals include water quality enhancement, and 5) a modeling tool for use in research and restoration planning.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1233327

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